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METROPOLITAN WATER BOARD.

GENERAL INFORMATION REGARDING THE METROPOLITAN WATER WORKS.

April, 1898.

The new source of supply is the water of the South Branch of the Nashua River, which is to be diverted at a point in the town of Clinton. This new source of supply is to be used in connection with the Sudbury and Cochituate sources, from which Boston now takes water, and the Nashua, Sudbury and Cochituate waters are to be supplied to the Metropolitan Water District. The Mystic system has been abandoned.

The Wachusett Dam is to be built at Clinton and the Wachusett Reservoir constructed.

The water diverted at Clinton from the Nashua River flows through the Wachuset Aqueduct to the Sudbury Reservoir at Southborough, and thence flows through existing reservoirs and works to Chestnut Hill Reservoir.

AREA OF WATERSHEDS.

Nashua,	118.23	square miles.
Sudbury,	75.2	" "
Cochituate,	18.87	" "
Total,	212.30	" "

DAILY CAPACITY IN DRIEST YEAR.

Cochituate and Sudbury, excluding Sudbury Reservoir,	48,000,000	gallons.
Cochituate and Sudbury, including Sudbury Reservoir,	62,000,000	"
Cochituate and Sudbury, including Sudbury Reservoir and flow from Nashua River,	101,000,000	"
Nashua, Cochituate and Sudbury, after construction of Wachusett Reservoir,	173,000,000	"

More water can be obtained when needed by adding sources in central and western Massachusetts, with the following totals: —

After adding Assabet,	201,000,000	gallons.
After adding Upper Ware,	272,000,000	"
After adding Lower Ware and Swift,	472,000,000	"
After adding Deerfield,	870,000,000	"
After adding Westfield,	990,000,000	"

PROPOSED RESERVOIR AND DAM UPON THE NASHUA RIVER.

WACHUSETT RESERVOIR IN CLINTON, BOYLSTON, WEST BOYLSTON AND STERLING.

Water surface,	4,195 acres, or 6.56 square miles.
Total contents,	63,068,000,000 gallons.
Length,	8.41 miles.
Maximum width,	2.05 miles
Total length of shore line, not including the islands,	35.40 miles.
Maximum depth,	129 feet.
Average depth,	46 feet.
Length of railroad flooded,	6 56 miles.
Length of roads flooded,	19.21 miles.
Inhabitants on land required for reservoir,	1,711.
Dwellings on land required for reservoir,	224.
Mills on land required for reservoir,	6
School-houses on land required for reservoir,	6.
Churches on land required for reservoir,	4.

WACHUSETT DAM AT CLINTON.

To be built of masonry and founded on solid rock.

Length across valley at water level,	1,250 feet.
Maximum height of water above bed of river,	129 "
Maximum height of water above surface of rock,	184 "
Water level, above Boston city base,	395 "

DISTANCES ALONG VALLEY FROM MAIN DAM AND APPROXIMATE DEPTHS OF WATER IN PROPOSED RESERVOIR.

Distance from Main Dam. Miles.	Depth of water in bottom of valley. Feet.	Remarks.
0	129	
1	110	
1.3	105	Opposite South Clinton station.
2	100	
2.6	80.	Opposite Boylston station.
3	95	
4	80	
4.4	70	Highway crossing.
5	73	
5.7	57	Opposite Clarendon Mills.
6	55	Opposite West Boylston station.
7	30	
7.4	20	Opposite railroad crossing, Oakdale.
8	19	
8.8	0	

Beside the masonry dam, long dikes are to be built on both sides to prevent the water of the reservoir from overflowing its banks.

A temporary dam has been built in Clinton just above the site of the proposed Wachusett Dam. A wooden flume has been built to connect with the beginning of the Nashua Aqueduct, through which the water is diverted into the aqueduct. The building of the temporary dam was also a necessary preliminary to the construction of the main dam.

NOT FOR SALE

WACHUSETT AQUEDUCT.

This aqueduct has been built a distance of 12 miles from the site of the dam at Clinton, through Berlin, Northborough and Marlborough, to the new Sudbury Reservoir at Southborough.

The aqueduct includes: —

First. — *Two miles* rock tunnel lined throughout on the bottom and arched where the rock is not sufficiently stable. Nearly half of the tunnel required arching. The tunnel where not arched is 13 feet 6 inches wide, and 11 feet 10 inches high; where arched, 12 feet 2 inches wide, and 10 feet 10 inches high. The slope is one foot in 5,000.

Second. — *Seven miles* of masonry aqueduct built and covered with earth. The bottom and side walls are built of Rosendale cement concrete masonry, lined with brick work. The upper arch is built of Portland cement concrete masonry. This portion of the aqueduct is 11 feet 6 inches wide, and 10 feet 6 inches high; the slope is one foot in 2,500.

Third. — A seven-arch granite bridge carrying the aqueduct over the Assabet River. This bridge has a total length of 359 *feet*. The lower part of the aqueduct on the bridge has the same shape as adjacent portions of the aqueduct, but the upper part is rectangular and covered with iron beams and brick arches. To insure water tightness, an interior lining of lead has been built into the brick work, 8 inches back from the inside of the aqueduct.

Fourth. — *Three miles* of open channel. This channel is 20 feet wide on the bottom, and has side slopes of three horizontal to one vertical. A minimum depth of about 6 feet of water is maintained in it by means of a dam at the lower end and another dam rather more than half way up the channel. The purpose of these dams is to cause a slow velocity, which will not scour the banks, and to avoid trouble with ice in winter. The channel empties into the upper end of one of the branches of Sudbury Reservoir.

SUDBURY RESERVOIR AND DAM.

This reservoir and dam was designed and begun by the city of Boston. The Metropolitan Water Board assumed the construction in 1896, and they are now substantially completed.

Water surface,	2 square miles.
Contents,	7,500,000,000 gallons.
Maximum depth,	65 feet.
Average depth,	19 "
Total length of dam at water level,	1,865 "
Water level above Boston city base,	260 "
Number of cubic yards of soil and other earth removed and to be removed in cleaning the reservoir,	4,600,000.

The central portion of the dam for a length of 300 feet is a masonry spillway founded on solid rock; the remainder of the dam is an earth embankment, with a concrete masonry core wall extending to the rock.

The reservoir is nearly filled with water from the Nashua River, and from this portion of the Sudbury water-shed.

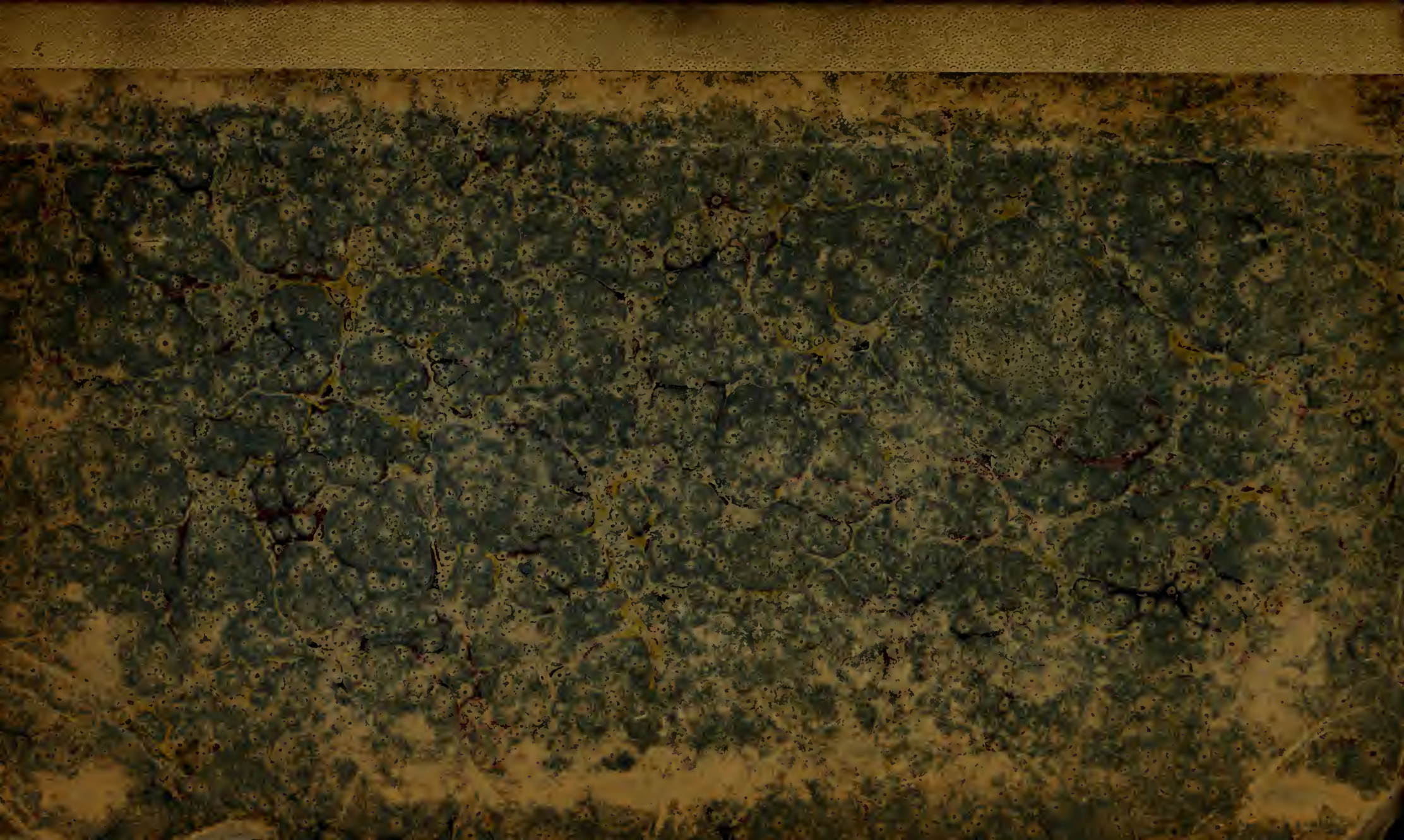
From Wachusett Reservoir to Chestnut Hill Reservoir.

The water flows by an open waterway from the ~~Wachusett~~ Sudbury Dam to the Framingham Reservoir No. 3. A 48-inch main pipe has been laid from the latter reservoir to Framingham Dam No. 1, and through this pipe and a similar pipe previously laid the water flows into the Sudbury Aqueduct, and thence to the Chestnut Hill Reservoir.

In the near future a new aqueduct to the Metropolitan District will be required. This will run from the Sudbury Reservoir to a point in Weston a short distance west of Charles River; its total length will be 13.26 miles and its estimated cost $3,226,000. This aqueduct at its terminus will be about 60 feet higher than Chestnut Hill Reservoir, so that it will furnish a supply by gravity, through pipes, to the lower part of the Metropolitan District.

DISTRIBUTION SYSTEM.

An addition to the Chestnut Hill Pumping Station is building, and a new pumping engine for the high service, having a total capacity of 30,000,000 gallons, will be added. A new pumping station is to be erected easterly of the present pumping station for the low service, and three engines, each with a capacity of 35,000,000 gallons, have been contracted for.

For the present Chestnut Hill Reservoir will remain the centre from which all water for the Metropolitan District must be distributed. Two lines of 48-inch pipe are required to be laid from Chestnut Hill Reservoir to supply water to the communities north of the Charles River and to Spot Pond, which will be used as the main distributing reservoir for the low service system. This pond is 20 feet higher than Chestnut Hill Reservoir, and the water is pumped into it, for which the existing pumps are used temporarily. The more easterly of these lines, which passes through Brookline, Cambridge, Somerville, Medford, Malden, Melrose and the easterly part of Stoneham to Spot Pond, is now all laid, and the work upon the westerly line is far advanced. An important branch, 48 inches and 42 inches in diameter, runs from the easterly line in Malden to Everett and Chelsea. The high lands in the southerly part of the district will be supplied with water pumped at the existing high service pumping station at Chestnut Hill Reservoir, in which an additional 30,000,000-gallon pumping engine is now being placed. The pipe lines from this station extend to Belmont on the north and to Quincy on the south, and are nearly all laid. The largest pipes of this system are 48 inches in diameter. The high lands in the northerly part of the district will be supplied from a high service reservoir located in an elevated portion of the Middlesex Fells, this reservoir to be supplied with water from a pumping station on the easterly shore of Spot Pond. The pipe lines of this system extend through Malden and Medford to Somerville on the west and south, and through Everett, Chelsea, Revere and Winthrop to Breed's Island on the east. The largest pipes are 36 inches in diameter. About 43 miles of pipe have been laid. About 10 more miles of pipe will be required.

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